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IS 10996 (1984): Stop Clock with Fly-Back Action [PGD 22: Educational Instruments and Equipment]

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"REAFFIRMED 1990"

IS : 10996 - 1984

(Reaffirmed 2001)

Indian Standard

SPECIFICATION FOR STOP CLOCK WITH FLY-BACK ACTION

Educational Instruments and Equipment Sectional Committee, EDC 77; Physical Science Subcommittee, EDC 77 : 1 [Ref : Doc : EDC 77 (4044)]

1. Scope — Covers stop clock with fly-back action.

2. Terminology

2.1 *Base* — Rectangular-rim support normally an integral part of the case of the clock.

2.2 *Case* — Housing in which the clock movement is fitted.

2.3 *Cover* — It is fitted on to the case on the dial side.

2.4 *Dial* — Graduated circular plate bearing numbers and graduation lines.

2.5 *Flyback Mechanism* — An arrangement actuated by a lever to cause the hands to fly back to zero position.

2.6 *Hands* — The pointers to indicate the reading of time on the dial of the back.

2.7 *Key* — Winding device for the clock.

2.8 *Levers* — Lever for actuating START and STOP; lever for actuating fly-back mechanism.

2.9 *Movement* — Clock movement which registers time.

2.10 *Spring* — Spring-like element which when wound gives energy for actuating the clock movement.

3. Material — The clock movement, fly-back mechanism, hands, levers and key shall be of suitable non-corrosive metals (or metals with anti-corrosion treatment/painting). The case of the clock may be made of metal or plastic or other suitable materials.

4. General Requirements

4.1 The metallic case shall have a durable and corrosion-resistant paint with good finish. The case shall be dust proof with side openings for START/STOP lever on left and fly-back lever on right.

4.1.1 The markings 'START', 'STOP', 'FLYBACK' shall be engraved or embossed at appropriate places on the case.

4.1.2 The dial shall have outer circle of minimum 80 mm opening diameter and may be available in sizes in steps of 10 mm of this diameter. The dial shall be securely fastened to its base so as to prevent warping or any other irregularity.

4.2 The dial shall have two concentric circles with at least 3 mm difference in radii. The dial shall incorporate 5, 10, 15, 60 markings in steps of 5 s on concentric circle in Arabic numerals. The size of each figure shall be at least 4 mm in height. The figures shall be oriented radially, as read from the centre. Between each pair of figures there shall be four equi-spaced and at least 2 mm long radial lines marked between the peripheries of the concentric circles to indicate intermediate seconds. The thickness of radial lines shall not be more than one-fourth of the distance between two consecutive lines.

4.3 There shall be one second hand and one minute hand. The minute hand shall be shorter, black in colour and may just touch the inner circle. The second hand, red in colour, may just touch the outer circle.

4.3.1 The hands shall be suitably tapered and the width of the tip of the hands shall not be more than the thickness of graduation lines on the dial.

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4.4 The clock movement shall be fixed to the case in such a way that there is no possibility of its being displaced during winding or use. The fixing of the movement to the case should be such that it is easy to open and refit during service.

4.5 The cover shall consist of circular flat or convex transparent material such as glass or plastic and a retaining ring to fit on the case.

4.5.1 The transparent material of the cover shall be of good quality to provide clear vision. It shall not get warped or distorted during use.

4.6 The stop clock shall have a stable and level base to keep the clock upright in a vertical position with '60' mark at the top.

4.7 Winding key shall be such as to provide full grip with two fore-fingers and thumb.

4.8 The different parts shall be made of good quality materials conforming to the requirements of relevant Indian Standards wherever published. The case shall be suitably finished for corrosion resistance to meet the acceptance tests as specified in the contract or order.

4.9 A suitable hanger may be provided at the top of the case.

5. Functional Requirements

5.1 The stop clock shall work satisfactorily in temperature range of −10°C to 55°C.

5.2 The stop clock shall operate for not less than 8 h on one complete winding of the main spring.

5.3 The START/STOP lever and fly-back lever shall be easy to operate just with finger force. Directions of START, STOP and FLYBACK shall be marked on the case near the levers.

5.4 The indications of the minute hand and the second hand shall be in agreement with each other. At the time of coincidence of the minute hand with marks 15, 30, 45 or 60 on the dial, the position of the second hand shall be within ± 2 s (that is 12°) of the mark '60'.

5.5 Stop clock shall run for 100 h continuously before the requirement of clause **5.2**.

5.5.1 At the end of 2 000 h, the stop clock shall be subjected at tests forconformity to requirements given in **5.2** to **5.4**, **6.2(a)** and **6.2.1**.

Note — The above test shall be carried out for the purpose of type approval only.

5.6 The probability of the clock giving trouble-free satisfactory operation for a continuous run of 2 000 h shall be 0·95. The clock shall be deemed to give trouble free satisfactory service if it meets the requirements of **5.1** to **5.5**.

6. Inspection and Tests

6.1 Stop clock will be visually examined for the following:

a) General appearance and external defects, such as any loose, missing, damaged or scratched component;

b) Any noticeable defect in the fitting of dial, lever, etc;

c) Markings on the dial for any missing, illegible or incomplete marks, scratches or dents in the dial;

d) Second or minute hand rubbing against either dial or cover, obstruction in the movement of hands and for any bent, distorted or damaged hand;

e) Surface quality of cover and presence of any irregularity which may impair vision; and

f) Stability of the base.

6.2 Stop clocks shall be subjected to tests at ambient temperature and at temperature of +55°C and −10°C as given below:

a) *Ambient temperature test* — The stop clock shall be tested with the help of a standard chronometer (or standard quartz clock) during a period of 100 h at ambient temperature. The stop clock shall be rewound after it has run for 8 h without adjusting the time regulator if provided and the difference in time measured after 100 h divided by 100. This average hourly variation in time shall not exceed ±15 s. The test shall be carried out in vertical position of the clock.

b) Test at +55°C and −10°C — These tests shall be repeated as in **6.2**(a) keeping the stop clock in vertical position only. The total inaccuracy of time keeping shall not exceed ±20 s/h without changing the setting of the time regulator.

6.2.1 The error shall be within ±0·2 s for any interval of 30 s.

6.3 The stop clock shall be tested for conformity to the requirement of **5.2**.

6.4 The stop clock, having its winding spring run down shall function again by giving one full rotation to the winding key.

7. Marking

7.1 Each stop clock shall be marked legibly at appropriate place as under:

a) Makers' name or registered trade-mark, and

b) Serial number.

7.2 *ISI Certification Marking* — Details available with Indian Standards Institution.

8. Sampling

8.1 Unless otherwise specified in the contact and order, the procedure given in IS : 2500 (Part 1)-1973 'Sampling inspection tables : Part 1 Inspection by attributes and by count of defects (*first revision*)', shall be followed for sampling inspection. The inspection level and sampling plan as given in **8.1.1** to **8.1.3** shall be followed for various tests.

8.1.1 For the characteristics given in **5.2** to **5.4**, **6.2(a)** and **6.2.1**, the scale of sampling shall be according to level III given in Table 1 of IS : 2500 (Part 1)-1973. The single sampling plan with AQL 2·5 percent given in Table 2 of IS : 2500 (Part 1)-1973 shall be followed.

8.1.2 For tests given in **6.2(b)**, the single sampling plan with inspection level I and AQL 2·5 percent given in Tables 1 and 2 respectively of IS : 2500 (Part 1)-1973 shall be followed.

8.1.3 For the type test given in **5.6**, the number of stop clocks to be tested shall be 5. All the stop clocks shall meet the relevant specified requirements.

EXPLANATORY NOTE

This stop clock is generally used for measuring the time-interval of an activity/process and for measuring the duration of each of several activities in a sequence, it works on the principle of clock movement.

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TO

IS:10996-1984 SPECIFICATION FOR STOP CLOCK WITH FLY-BACK ACTION

(Page 1, clause 2.6) - Substitute 'clock' for 'back'.

(Page 1, clause 4.2, line 2) - Substitute '5, 10, 15, ...60,' for '5, 10, 15, 60'.

(Page 1, clause 4.3) - Substitute the following for the existing clause:

'4.3 There shall be one second-hand and one minute-hand. The minute-hand shall be shorter, black in colour and may just extend to the inner circle. The second-hand, red in colour, may just extend to the outer circle.'

(EDC 77)

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